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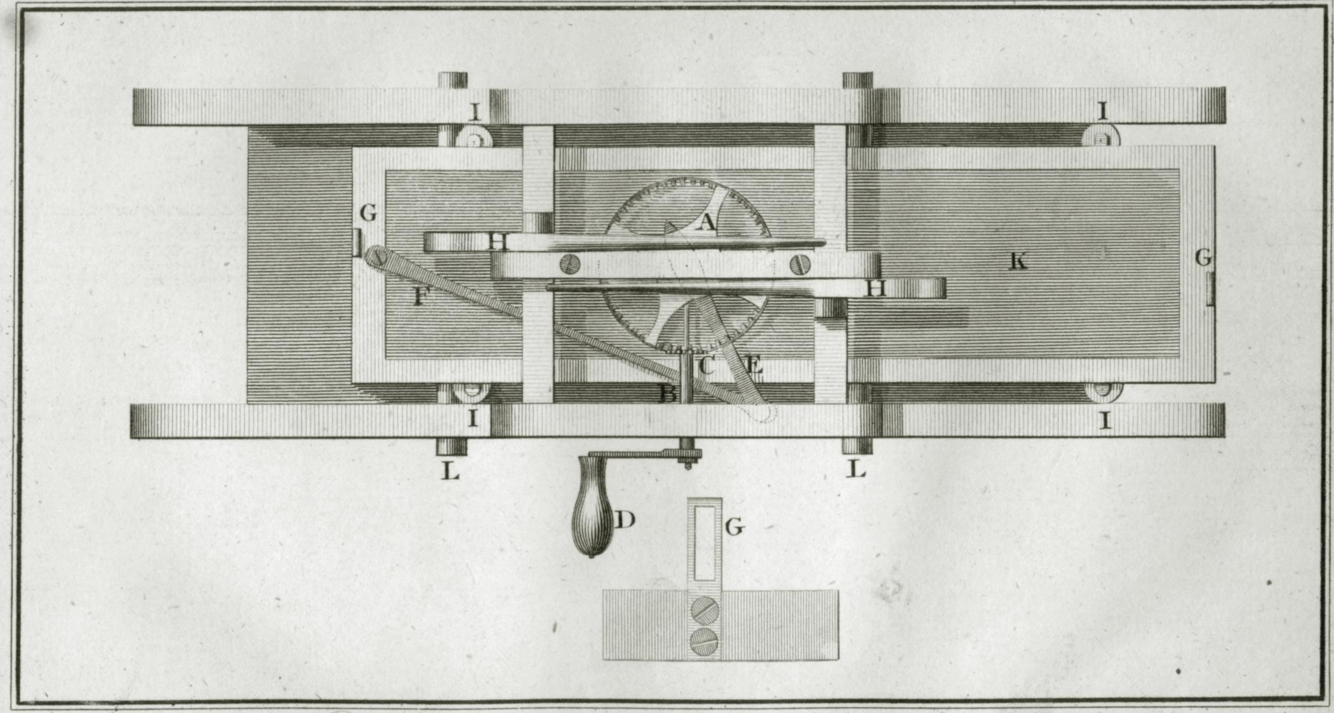
PAPERS

IN

MECHANICKS

Plate 1.



A Plan of an improved Mangle by M^r George Jee.

MECHANICKS.

In conſideration of the merit of the MANGLE invented by Mr. JEE, the Society this Seſſion voted their SILVER MEDAL to him; and Plates, and a Deſcription of the Mangle, are annexed, and two complete Models reſerved in the Repoſitory, for the uſe of the Public.

I BEG leave to preſent to the Society for the Encouragement of Arts, Manufactures, &c. for their inſpection, the Model of a Machine (of my own invention) for Mangling Linen.

This Mangle is ſo conſtructed, that the handle is required to be turned one way only, which moves the machine more ſteadily, and ſafer to the linen, than by varying the turnings of the handle. I have made ſeveral Mangles on this conſtruction at large, which have anſwered the purpoſes very well, and given general ſatisfaction to all who have ſeen them at work. It is found, that a woman and a boy are ſufficient to work this Mangle, and can do as much work (in the ſame time) as three or four perſons at any other I have ſeen. This induced me to preſent it to the Society, knowing of no other way ſo likely to convey it to the community at large, as through the channel of your excellent yearly publication of the Tranſactions of the Society. If it is found worthy of a place in the Society's Repoſitory, and they think it worth laying before the public, it is at your ſervice, and will give me the greateſt ſatisfaction.

I am, SIR,

Your moſt obedient,

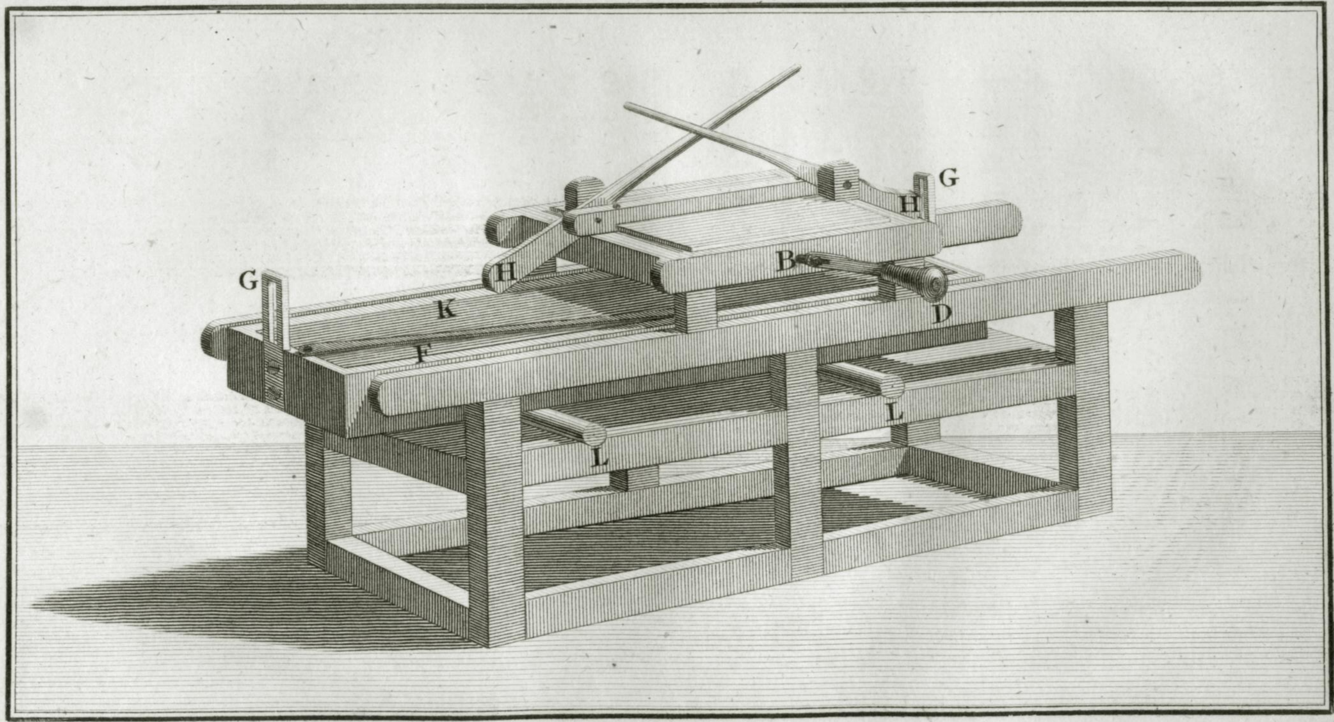
very humble ſervant,

GEORGE JEE.

Rotherham,
April, 24, 1797.

Mr. MORE.

Plate 2.



A View of Mr. George Jee's improved Mangle.

The DESCRIPTION *of* PLATE I.

A, The great wheel, which in the Machine at large is fifteen inches diameter. B, the arbor, on which the nut C is fixed. D, the handle of the winch. E, the crank, twenty-one inches long. F, the rod of the crank. G G, the hollow ſtuds, to lift the ends of the bed up. H H, the levers. I I I I, the four pullies fixed on the moveable bed. K, the moveable bed. L L, the ends of the rollers.

At the bottom of this Plate is a front view of one of the hollow ſtuds, G, to ſhew its form, as ſtanding at the end of the bed, and into which the levers alternately enter, when it becomes neceſſary to lift up the bed to put in or take out the rollers.

PLATE II. is a perſpective view of the Mangle when at work; the letters of reference to the ſeveral parts being the ſame as in Plate I.

A Bounty of THIRTY GUINEAS was this Seſſion voted to Mr. JOHN PRIOR, for his improved detached ESCAPEMENT FOR WATCHES, a Plate and Deſcription of which are hereunto annexed, and a complete Model reſerved in the Society's Repoſitory, for the inſpection and uſe of the Public.

SIR,

AS all our beſt writers on watches agree, that the longer the vibration of a balance is, the better it will keep time, and as no detached Eſcapement has been made (that I know of), in which the balance paſſes over the ſame ſpace in one vibration that mine does; I am encouraged to preſent this Machine, with a Drawing, and an explanation of the ſame, for the inſpection of the Society.

The

Fig 2.

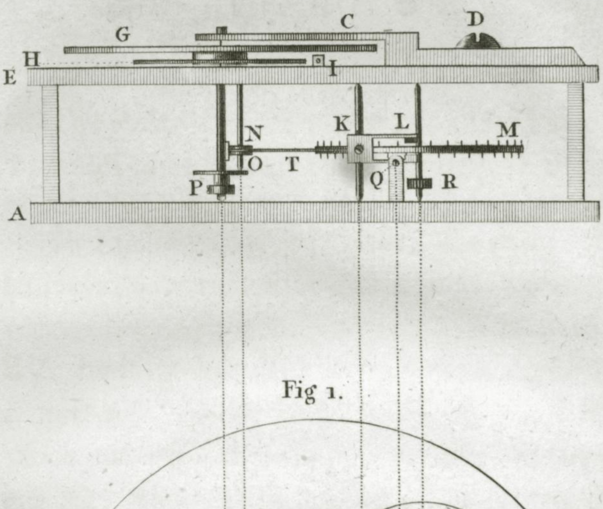
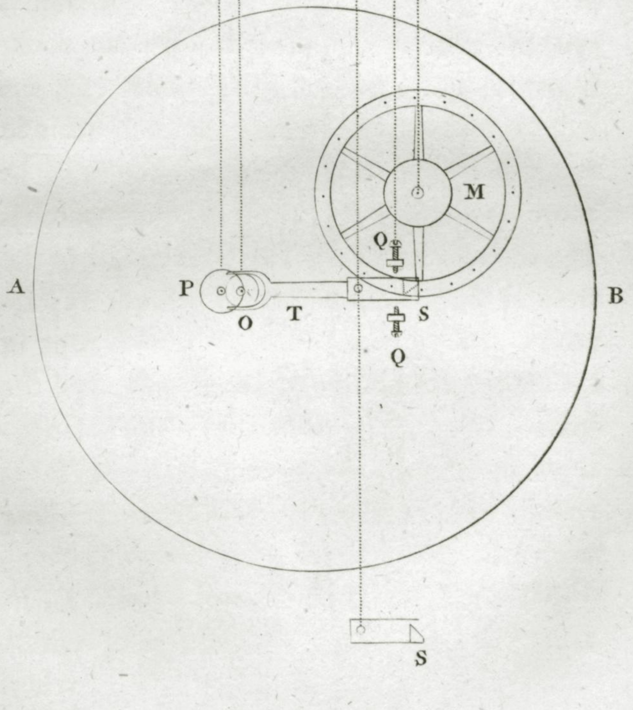


Fig 1.



Mr. John Prior's Improved Escapement.

The DESCRIPTION *of the new-invented* DETACHED ESCAPEMENT FOR POCKET WATCHES, &c.

Fig. I. and *II.* repreſent the principal parts of it.

Fig. I. A B, the pillar-plate; and A B E F. *Fig. II.* is a ſection of the frame, without pillars or potance. C, the cock, ſcrewed to the potance-plate at D. G, the balance, the lower point of which runs in the plate (but perhaps a potance will be more convenient for it in a pocket watch). H, the regulating ſpring, pinned faſt in the ſtud at I. O, the friction wheel; N, its arbor, the higher pivot of which runs in the collet the balance is rivetted to, and the lower in a collet ſcrewed faſt on the balance-arbor at P: ſo, when the balance turns round, the friction-wheel is taken along with it.

M, the intermittent lever-wheel. L, its arbor; R, its pinion, in the rim of which wheel are put an equal number of pins on each ſide. The pins on one ſide of the wheel are put exactly at the middle diſtance of thoſe on the other ſide.

T, the intermittent lever, ſcrewed faſt to K, its arbor. QQ are its banking ſcrews.

This lever is all made of one ſolid piece of ſteel. That end of it next the wheel is cut open wide enough to receive the rim, without touching either ſide of it, as far as the pallets or inclined planes are; at the end of which it is cut wider, to admit the pins of the wheel. See *Fig. II*, a ſection of it as under L.)

The diſtance from the centre of the balance to the extreme part of the lever, or end of the pallets, is divided, in a right line, into ten equal parts, and the pivot-hole of the friction-wheel is made at the firſt tenth diviſion from the centre of the balance. There are thirteen ſemi-diameters of the friction-wheel from its centre to the end of the pallets.

When the balance is at reſt, then the centre of the balance, the centre of the friction-wheel, and the centre of the lever, will be all in one right line. (See *Fig. I.*)

The lever is divided into three equal parts. The diſtance from the end of the pallets to the centre of motion of the lever, one part; and from the centre of motion to the centre of the friction-wheel, when the balance is at reſt, two parts: ſo that, whatever the velocity may be at the end of the pallets when in motion, that part of the lever, or the forked part of it, which is oppoſite the centre of motion of the friction-wheel, will be twice as much.

S S repreſents a ſuperficial view of the pallets. The pallet below the pillar-plate is taken off from the other, otherwiſe the place of action could not be ſeen in the drawing.

In *Fig. I.* we have a view of the lever before the machine is wound up: a pin is half-way down the pallet; but when the pin impels the pallet, the lever moves, and gives motion to the balance, and the pin is diſengaged from the pallet at the angle: that inſtant a pin, on the oppoſite ſide of the wheel, falls upon a circular part of the end of the other pallet, or upon that part where it and the lever are entirely at reſt, until the balance makes its return, and the friction-wheel comes into the forked end of the lever. Then the friction-wheel impels the lever, while the balance runs over the ſpace of about twenty degrees, in which time the pin is diſengaged, from a place of reſt to a place of action, where it impels the lever while the balance runs over the ſpace of about one hundred degrees. Then the pin drops off at the end of the pallets as before, and the balance is entirely left at liberty; at which time its velocity is ſo great, and its motion ſo eaſy, that it turns once round upon its pivots, and two hundred and forty degrees every vibration.

It is to be obſerved that, in the ends of the fork, one part is turned up and the other down, in order they may not both go through one notch in the balance-arbor; for, by having two different parts cut away, the fork is locked faſt in every vibration, and is unlocked only by the friction-wheel, in its return for another vibration.

Notwithſtanding the balance makes one turn and two hundred and forty degrees every vibration around its axis, yet, when the balance is at reſt, and the ſame power applied to it (which keeps it in motion as above), the balance will only move through the ſpace of about fifteen degrees, which is only one fortieth part it keeps it up to when in motion.

It muſt be allowed, the leſs the wheels, or the power, have to do with the balance, the more accurate the time will be ſhewn.

I ſhall ſay no more on this ſubject, but refer it to the Society for the Encouragement of Arts.

SIR,

IN anſwer to your favour of February 10, I have to inform you with what intention I apply to the Society.

Firſt, My intention was for a bounty or premium, if the Society ſhould judge my New Eſcapement worthy.

Secondly, It was not my intention to ſecure this invention to myſelf, by obtaining a patent for it, but to lodge it in the Repoſitory for the inſpection of the Public.

Thirdly, I can ſincerely ſay, I never heard, by any perſon or perſons whatever, nor had the leaſt knowledge or information by any one living, relating to Mr. Mudge's Anchor-Scape, before I now came to London, nor even heard its name mentioned before you wrote your laſt letter to me.

I have, a few days ago, ſeen Mr. Mudge's Anchor-Scape, and find the wheel and pallets to be exactly like thoſe of a common clock with the dead ſcape. The only difference (in that which I ſaw) is the addition of an arm, whoſe length is the ſame from the centre of motion the pallets are of, the uſe of which is to give motion to the balance againſt two ſteps. The teeth of the wheel reſt, after every vibration, upon the outſide of one, and on the inſide of the other pallet, alternately. If that part where the tooth reſts be not exactly part of a circle, whoſe centre is the axis of the pallets, the balance, while diſengaging a tooth from a place where it ſhould reſt, will give motion to the wheel, and in ſo doing will find it more difficult to unlock, than it would be if that place was entirely circular. How theſe places of reſt are to be made entirely ſo without turning, I cannot tell; and if turned, time will be found neceſſary in the execution.

But, to make the Anchor-Scape ſtill more complete, the places where the tooth of the wheel reſts after every vibration ſhould be equal, and as ſhort as poſſible with ſafety, that the balance may looſen them with the leaſt power; but if the places of reſt be equal (as they ſhould be), the balance will paſs over more degrees in diſengaging a tooth on the inſide of the pallet, than it would do in looſening the other one on the outſide.

In my new-invented Eſcapement, the places of reſt are equal, and at an equal diſtance from the centre of motion (which cannot be the caſe of the Anchor-Scape), and both turned with eaſe at the ſame time: ſo the balance will paſs over an equal number of degrees, in diſengaging a pin from a place of reſt to a place of action, on each pallet, alternately.

The centre of motion of my lever is at one-third of its length: ſo, whatever the velocity of the pallets may be, the forked end of it is twice as much, and will follow the balance through one third more ſpace than the Anchor-Scape can do, which I ſaw at Mr. Howel's, or perhaps more, and by that means will cauſe the balance to turn entirely farther; and when the balance vibrates farther, all kind of external motion does not affect the vibrations ſo much as they would be if the balance vibrated leſs.

The ſame may be ſaid of the force from the main ſpring, which is communicated, through a train of wheels and pinions, up to the balance, which force will not be entirely equal, though executed by the beſt workman. But the vibrations of the balance will be entirely more uniform, though the impulſes given to it through a train of wheels, &c. be unequal, than they would be by the ſame power or impulſes, if the balance vibrated leſs.

The objections which may be made by thoſe who do not underſtand it, is the increaſe of friction upon the balance pivots; but that will be done away, when the ſuperior advantages are conſidered in their proper light.

And as the balance is that part of the watch which regulates the whole machine for time-keeping, it is neceſſary its motion ſhould be diſturbed the leaſt poſſible, both in receiving the impulſes, and diſengaging that part which gives it motion: this was my reaſon for introducing the friction-wheel, which goes into the fork of the lever at every vibration, diſengages a pin from a place of reſt, to where it acts upon the pallet, with as much more eaſe than it would have done (if the ſame diameter had been fixed), as the diameter of a pivot of the friction-wheel is contained in the diameter of the wheel, which may be twenty, or nearly thirty times: this, and the length of its vibrations, will add greatly to the perfection of its time-keeping.

If a wheel, which is going to be cut by an engine, be not put exactly in the centre of the circle the diviſions are put upon, though the diviſions are mathematically true, the wheel will be far from being ſo. Apply ſuch a one to the Anchor-Scape, and it incloſes as many errors as there are teeth between the pallets. Apply the ſame erroneous diviſions to my Eſcapement, and the errors will be four or five times leſs in mine than in the Anchor-Scape; and I ſuppoſe this cannot be got over. But if I have miſrepreſented any thing in either Scapements, it was not my intention to do ſo; therefore hope for pardon, and can only wiſh the Society to conſider my new-invented Eſcapement in the ſame light as they would wiſh others to conſider one of their own invention.

JOHN PRIOR.

Nesfield, near *Skipton*,
Craven, *Yorkſhire*.

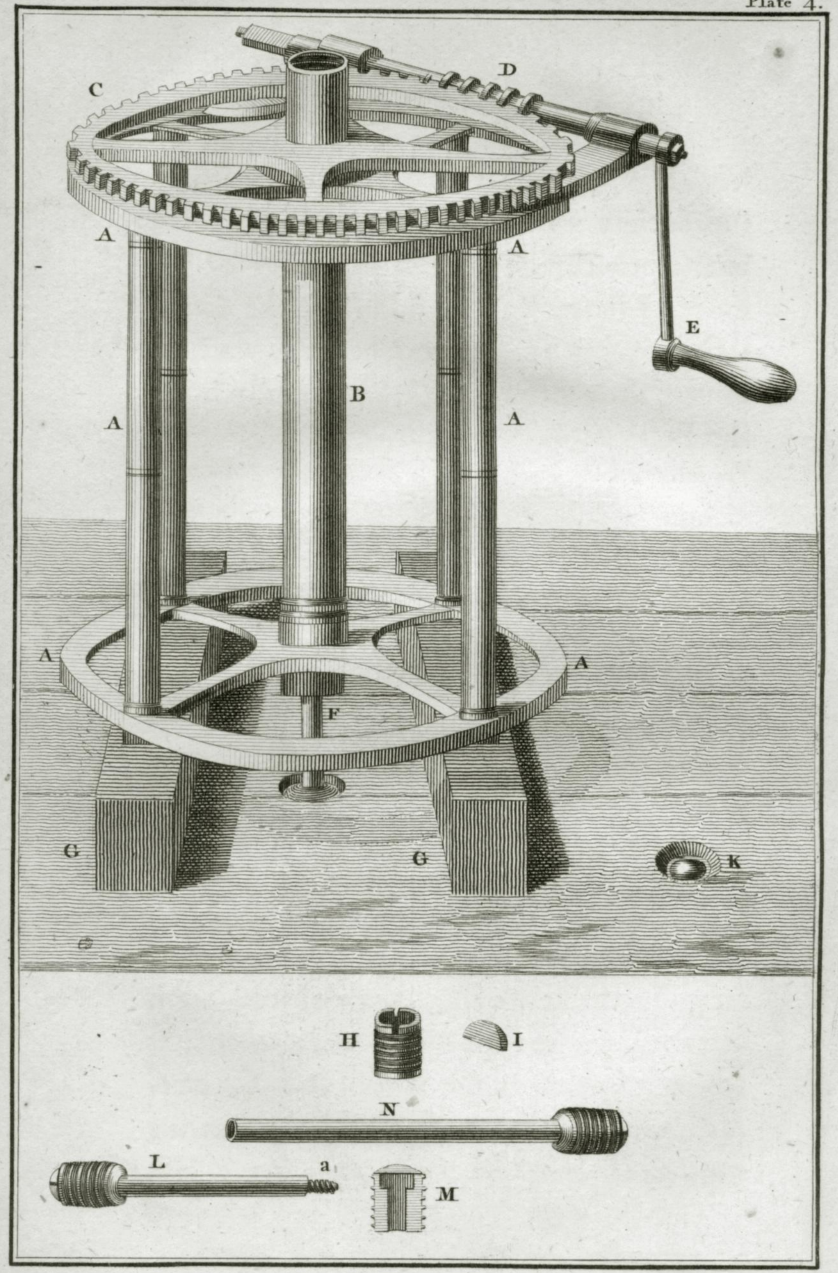
Mr. MORE.

The GOLD MEDAL was this Seſſion adjudged to Captain WILLIAM BOLTON, of the Navy, for his Invention of a MACHINE FOR DRAWING BOLTS IN AND OUT OF SHIPS, a Model of which is reſerved in the Society's Repoſitory, and a Plate and Deſcription are hereunto annexed.

SIR,

I SHALL be much obliged to you to lay the accompanying Model of a Machine for Drawing Bolts in and out of Ships, before the Society for the Encouragement of Arts, &c. truſting it will meet with the Society's approbation. One of your Premiums, I believe, is for a Machine for *Driving* Copper Bolts; *drawing* them in, I hope will be ſucceſsful.—I was induced to turn my thoughts to inventing a mode of Drawing Bolts out of Ships, from daily ſeeing the great difficulty of extracting them. A

Plate 4.



Cap^{t} W^{m} Bolton's new invented Machine for drawing Bolts in and out of Ships.

Mr. Hill, I believe, has already preſented the Society with a plan for that purpoſe; but, notwithſtanding the ingenuity of his mode, I flatter myſelf mine will be found an improvement, as it can be eaſily worked, in very little room, and will generally bring the Bolt out uninjured.

I remain
Your reſpectful ſervant,
WILLIAM BOLTON.

Mancheſter-ſtreet, No. 50,
Feb. 26, 1798.

Mr. MORE.

REFERENCES *to the* PLATE *of* CAPTAIN BOLTON'S MACHINE.

A A A A A A, the frame of the Machine. B, a cylindrical tube, having a female ſcrew in the inſide. C, a wheel with teeth attached to the cylinder B. D, an endleſs ſcrew adapted to the wheel C. E, handle of the winch. F, the Bolt drawing out. G G, blocks to ſupport the frame. H, a hollow a hollow piece of ſteel, having on its outſide a male ſcrew, whoſe threads work within the female ſcrew in the cylinder B. To this piece of ſteel the Bolt is to be rivetted. I, a ſemicircular piece of ſteel, which is to be introduced into the notches on H, when a ſimilar notch has been cut in the head of the Copper Bolt, which by this means is prevented turning in H, while drawing. K, the Bolt, as prepared to receive the Machine. L, a ſteel bar, ſomewhat ſmaller than the Bolt to be drawn, having at one end a male ſcrew, A, and at the other end another male ſcrew that fits into the female ſcrew in B. M, a ſection of a male ſcrew, having a ſquare hole larger than the Bolt. N, a Bolt with a male ſcrew at one end ready to be drawn in.

The Machine, of which a Plate is annexed, conſiſts of a frame ſupporting a cylindrical female ſcrew tube. On this tube is mounted a wheel, with teeth adapted to an endleſs ſcrew, fitted to the frame, and worked by a handle.

To draw the Bolt out.

The head of the Bolt muſt be cut off, and a hole made in the timber big enough to receive the male ſcrew H, which is put over the Bolt: a ſlit is then to be made, either by a ſaw or cold chiſſel, in the head of the Bolt, to receive the key I, and which correſponds to the ſlit in H: the Bolt head is then to be rivetted as firmly as poſſible upon H: the cylindrical tube, B, is then to be ſcrewed on, turning the whole Machine round till it can be done no longer, when the endleſs ſcrew is to be uſed. If the Machine is of a proper ſtrength, and the rivetting well done, the power is ſuch as to extract the Bolt or break it, but generally it will be drawn out uninjured.

To draw Bolts into Ships.

It will be neceſſary to have a bar, L, which I recommend to be made of ſteel, long enough to paſs from the inſide to the outſide of the ſhip, and ſomewhat ſmaller than the Copper Bolt intended to be drawn in. This may be called a conductor. On one end ſhould be a male ſcrew, *a*; the Bolt to be drawn in ſhould be tapped at one end to receive the male ſcrew, *a*, on the conductor, and at the other end ſhould be another male ſcrew that fits into the female ſcrew in B; after which the operation is the ſame as drawing a Bolt out, and the Machine ſhould be applied accordingly. When the Bolt arrives at its deſtined place, it may be ſecured on the inſide by a nut, which is as good a way of faſtening as clinching, and much more expeditious.

This Machine, though only of the height of eighteen inches, will draw Bolts in or out of any length; for, after the Bolt has riſen to the top of the tube, it will only be neceſſary to ſcrew the Machine back, and follow up the work with blocks of timber, as repreſented in the drawing.

Note. If the upper part of the hole in H be made ſquare, larger than the round hole as ſhewn at M, and the head of the Bolt rivetted into it, it will do away the neceſſity of the key, I, render the Machine leſs complicated, and ſave much time and trouble.

WILLIAM BOLTON.

ERRATUM.

For Mr. Alexander Anderſon, page 324, *read* Alexander Anderſon, M.D. F. R. S. Ed.